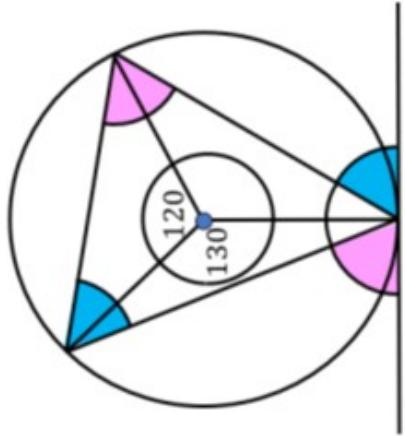
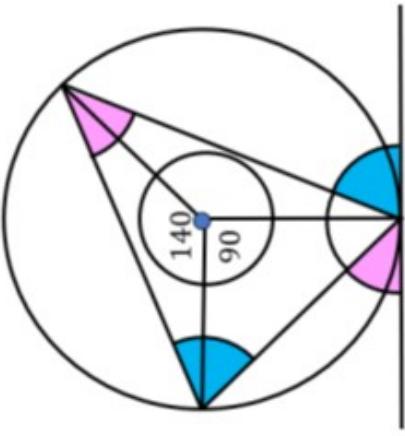
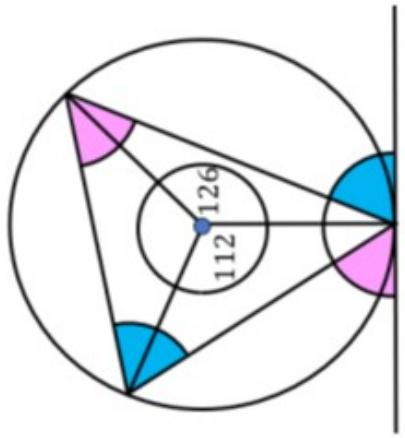
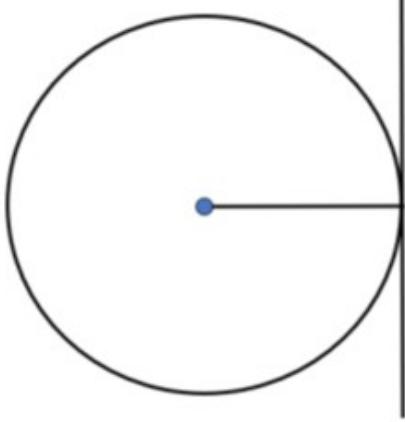


## **(7) Alternate segment theorem**

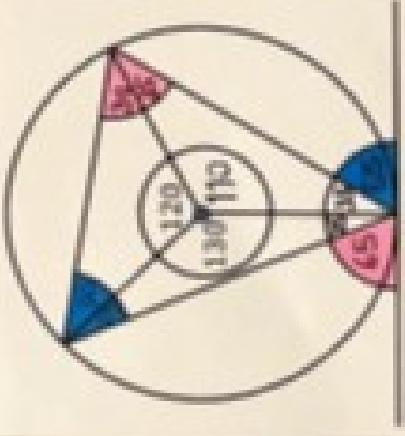
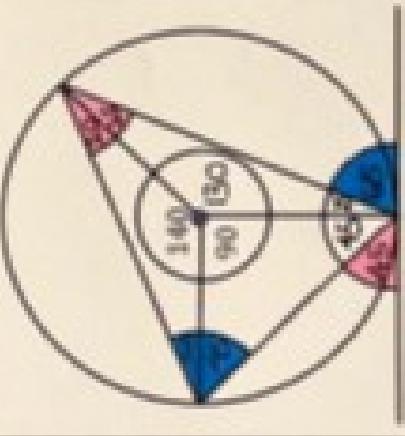
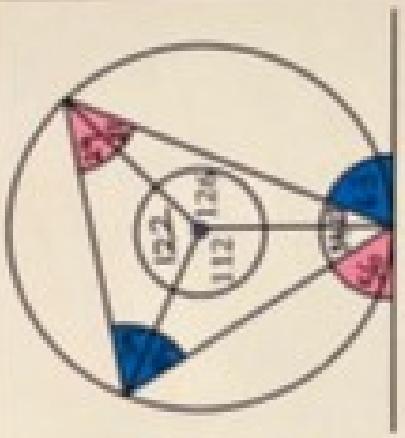
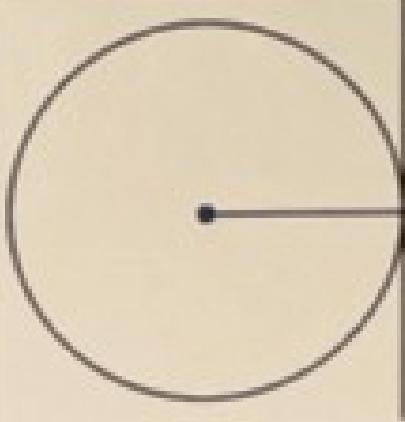
Do now:

The next three diagrams show three joined isosceles triangles inside a circle with a tangent. Calculate all marked angles and write down what you notice about the shaded angles. In the final diagram, choose your own angles and test your theory.

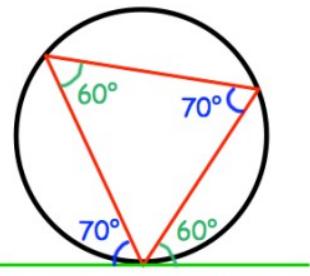


### What did you notice?

The next three diagrams show three joined isosceles triangles inside a circle with a tangent. Calculate all marked angles and write down what you notice about the shaded angles. In the final diagram, choose your own angles and test your theory.



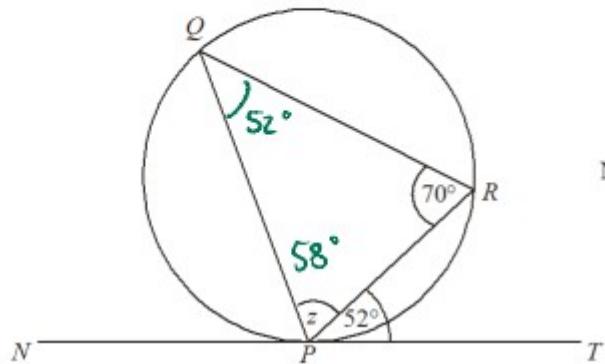
What did you notice? The pink angles are always equal. The blue angles are always equal.



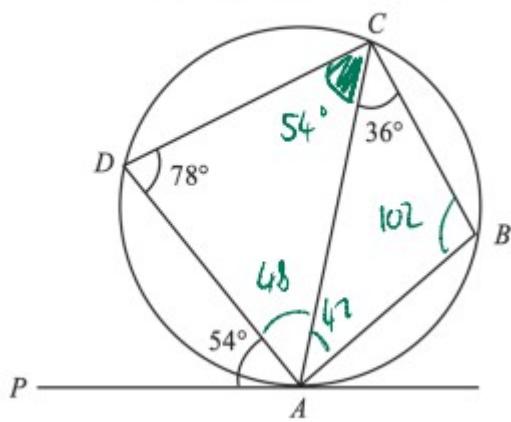
**Alternate segment theorem**

The angle between the chord and the tangent is equal to opposite angle inside the triangle.

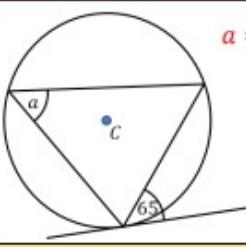
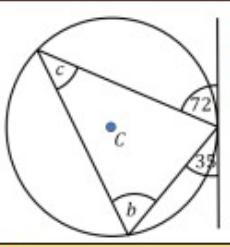
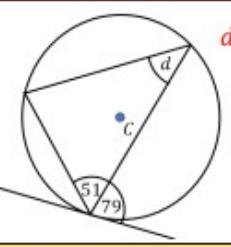
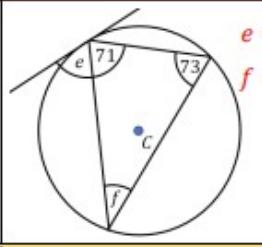
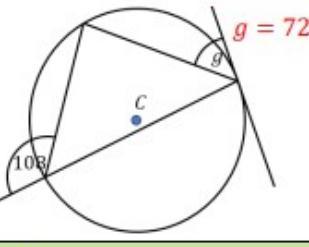
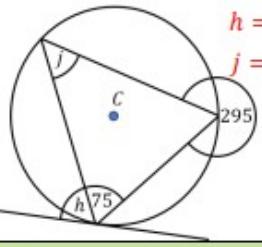
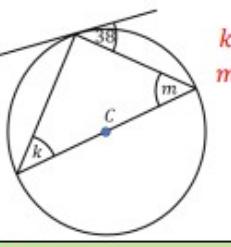
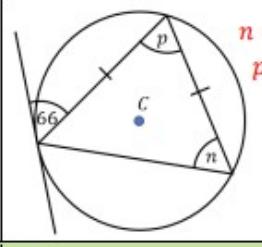
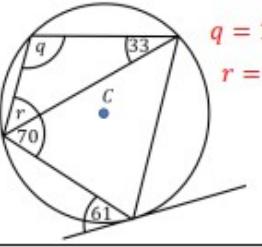
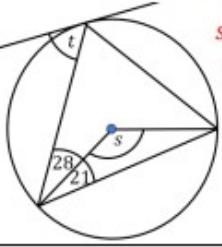
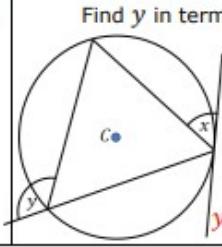
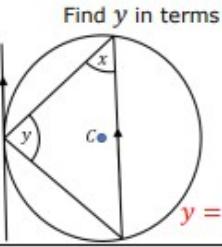
Check your understanding (1)



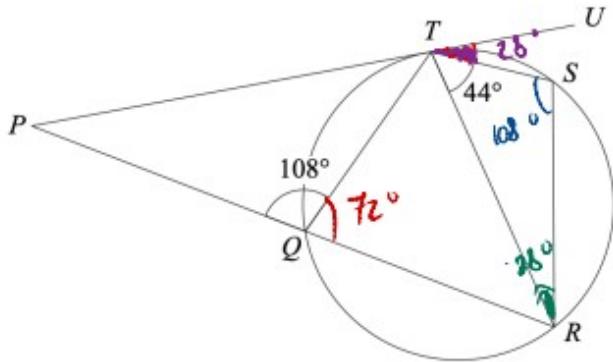
FIND ANGLE ACT



### Alternate Segment Theorem

(a)	(b)	(c)	(d)
			
(e)	(f)	(g)	(h)
			
(i)	(j)	(k)	(l)
		<p>Find <math>y</math> in terms of <math>x</math></p>  $y = 180 - x$	<p>Find <math>y</math> in terms of <math>x</math></p>  $y = 180 - 2x$

Exam question



$Q, R, S$  and  $T$  are points on the circumference of a circle.  
 $PU$  is a tangent to the circle at  $T$ .

$PQR$  is a straight line.

Angle  $PQT = 108^\circ$ .

Angle  $STR = 44^\circ$ .

Work out the size of angle  $STU$ .

You must give a reason for each step in your working.

$$\angle TQR = 72^\circ$$

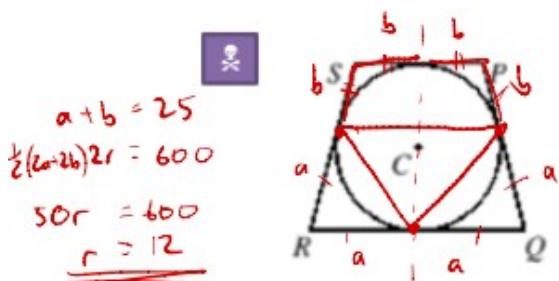
(ANGLES ON A  
STRAIGHT LINE SUM  
TO  $180^\circ$ )

$$\angle TSR = 108^\circ$$

(OPPOSITE ANGLES IN A  
CYCLIC QUADRILATERAL SUM  
TO  $180^\circ$ ).

$$\angle SRQ = 28^\circ \quad (\text{ANGLES IN A TRIANGLE SUM TO } 180^\circ)$$

$$\angle SUT = 28^\circ \quad (\text{ALTERNATE SEGMENT THEOREM})$$



[SMC 2012 Q20] In trapezium  $PQRS$ ,  $SR = PQ = 25\text{cm}$  and  $SP$  is parallel to  $RQ$ . All four sides of  $PQRS$  are tangent to a circle with centre  $C$ . The area of the trapezium is  $600\text{cm}^2$ . What is the radius of the circle?